

A PRIORI INFORMATION GUIDING BUSINESS JUDGMENT

ABSTRACT

This paper describes the relationship between the two levels of judgment; between the micro [economic] event under conditions of uncertainty that arises from the sociological composition of the business environment, and the macro umbrella of epistemology addressing knowledge at the [individual] human level. I argue that synthetic a priori knowledge exists in the capital markets at the macro level serving as a barometer of transparency guiding the behavior of buyers and sellers; these structures are found in the nature of how power shifts in a multi-buyer versus single-seller negotiation rooted in combinatorics, and in the risk-return relationship utilizing the cash-on-cash method for calculating angel investor returns metrics. However, I note that the sociological composition of the market renders any outcome inherently indeterminant at the micro event of the marginal business judgment. As such, all structures are merely descriptive patterns that only introduce a degree to transparency. Additionally, I contribute to existing typologies of uncertainty by extending the chain of cause-and-effects to account for time pressures, pointing out that a reactive stance implies a linear progression along the chain, whereas a proactive stance depicts a secondary source of causation that I refer to as effectual uncertainty.

Key Words: Judgment, synthetic a prior, capital markets, epistemology, Knightian Uncertainty

A PRIORI INFORMATION GUIDING BUSINESS JUDGMENT

1 | INTRODUCTION

I address the presence of natural structures in the free capital markets and investigate the implications of such structure on the micro [economic] business judgment as the marginal event. Three structures in particular have been identified, two pertaining to the notion of power (Oksoy, Nair & Willis, 2022) and one pertaining to the risk-return relationship during the exchange of risk capital for partial equity ownership in a nascent venture (Oksoy, Farrell & Li, 2025). The key insight across these crisp mathematical statements is evidence pointing to the existence of *synthetic a priori* information that structures the nature of interactions between buyers and sellers; in epistemology, a priori refers to knowledge that exists outside of our experience, whereas synthetic a priori represents knowledge that is necessary and universal (transcendental principles; Kant, 1787; Gotshalk, 1933; Bealer, 1999; Friedman, 2008). To the best of my knowledge, this is the first article to explicitly identifying that such structure exists.

The larger question is if [discoverable] objective truths exist in free capital markets. Knowledge in business is not the same as that found across the natural sciences when we recognize the evolving sociological composition of the market; its reaction (the effect) to any marginal effectuation effort by an actor (the cause) is inherently indeterminant. In business, the market recalibrates in reaction to its parts; whereas in the natural sciences the problem is effectively ‘fixed’ and the effort is to provide a [global] solution or at least a very close approximation of causality (e.g., gravity); incidentally, this is where entrepreneurship enters the picture by creating new chains of cause and effects. And as such, business presents circumstances where there should be no objective ‘truth’ because of the natural fluctuations of human behavior influenced by technological advancements and societal shifts (Hayek, 1945; Boudreaux & Holcombe 1989). Knight (1921) clarifies this point by stating that a priori “probability is practically never met with in business” (p. 215); rather, judgments tend to take the form of either *statistical* based on observed frequency of events, or *estimates* that are equated to the notion of intuition. The judgment-based approach (JBA) is the modern theoretical paradigm investigating these questions within business (e.g., Foss & Klein, 2012), serving as a counterbalance to the notion that any objective truths exist to be discovered via an alert state of

consciousness (Kirnzer, 1973). Instead, JBA scholars recognize that knowledge in business is a more subjective assessment (i.e., conjecture) (e.g., Dorobat, et al., 2025).

My central argument is that objectivity and subjectivity are not necessarily mutually exclusive but rather they coexist: while objective patterns do exist that point to the [natural] structure of markets, the actor must still exercise their subjective judgment in any particular application of their knowledge of the discovered patterns. Ultimately, all that is conveyed in this paper is a sense of [situational] awareness to the actor by describing the nature of patterns that exist when encountering certain economic circumstances such as a negotiation pitting multiple buyers against a single seller, and when exchanging risk capital for partial equity ownership. Awareness of one's position on these curves should improve judgment when in the thick of things.

This paper begins with a *brief* review of epistemology and the 'classical' typology of judgment that accounts for the nature of a priori information, followed by a review of recently discovered patterns observed during negotiations between angel investors and entrepreneurs, to then draw a direct connection between epistemology [proper] and the free capital markets. This is followed by a review (and critique) of contemporary typologies of uncertainty in business to then introduce a modification that accounts for the actor's potential to proactively influence the market. I conclude by considering the ability of practitioners to properly integrate this knowledge, noting the inherent challenges associated with the inherent uncertainty in the market's reaction.

2 | THE A PRIORI

This section on the *a priori* is meant to establish the basic principles of epistemology in order to better articulate the applicability and implications of the discovered insights on power and the risk-return relationship. I must disclose that these discoveries were entirely serendipitous outcomes from an effort to better understand the economic phenomenon of angel investing that involves the discretionary investment of capital for partial equity ownership in a nascent firm. And while these discoveries motivate my revisiting of epistemology, this is only a slight dip of the toe as it pertains to the *a priori* [aided significantly by recent reviews]. To further help orient the focus, natural structures fall within metaphysics that "has to do with the ultimate nature of the reality which reveals itself alike in the consciousness which knows and the world which is

known” (Seth, 1892: 138), whereas epistemology “is an investigation of...the relation of knowledge to reality, of the validity of knowledge” (Seth, 1892: 130). In effect, this paper builds upon what is (metaphysics) to address the implications of that knowledge on judgment (epistemology).

Epistemology (Certainty vs. Uncertainty)

Epistemology is “the study or a theory of the nature and grounds of knowledge especially with reference to its limits and validity” (Merriam-Webster). To summarize in a rough manner, epistemology addresses the implications of fundamental *certainties* that exist in our world that are typically discovered across the natural sciences as indubitable proofs. Mentioned as early as Euclid’s *Elements*, the domain of knowledge has been traditionally delineated as *a priori* meaning what came before and *a posteriori* meaning what came after, with the tension revolving around experiences. The critical question is if [and what type of] knowledge exists outside of experience (e.g., Hodgson, 1877; Kant, 1787).

In contrast, business scholars address the inherent *uncertainty* of markets due to its sociological composition (referred to as Knightian Uncertainty, or fundamental uncertainty as per Dequech, 2011, or aleatory uncertainty that is immitigable as per Packard & Clark, 2020). As a result of this realm of uncertainty, a significant portion of epistemology referred to as the *a priori* has not been integrated because as Knight (1921: 215) states, this “type of probability is practically never met”, such that there is an “absolutely homogenous classification of instances completely identical except for indeterminant factors” (p. 224). The principal problem of uncertainty in the market “is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exist in concentrated or integrated form, but solely as the disbursed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess” (Hayek, 1945: 519). The term *bounded rationality* will be later introduced (Simon, 1955; 1957)¹ to succinctly capture this fundamental limitation of market participants and thus of the market itself.

As such, any structure that we do observe is a derivative of market interactions (i.e., transactions; exchanges) referred to as the price system that serves as a [the] central coordinating

¹ “The paradox vanishes, and the outlines of theory begin to emerge when we substitute for “economic man” or “administrative man” a choosing organism of limited knowledge and ability” (Simon, 1955: 114)

mechanism, where the “whole acts as one market, not because any of its members survey the whole field, but because their limited individual fields of vision sufficiently overlap so that through many intermediaries the relevant information is communicated to all” (pg. 526). “The most significant fact about this system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action” (Hayek, 1945: p. 526-527). It would thus seem that because markets are a derivative of human activity (i.e., experience), that *a priori* knowledge should not exist in business. And yet, and as addressed in this paper, there are indeed crisp patterns that influence human behavior that we must make sense of.

Shifts in Perspective

Epistemology is itself limited by our inability to fully explain our own existence while being able to question it. As such, the progression of epistemology is one of shifting perspectives as periodically influenced by jarring shifts in science — typically in the realm of physics and the motion of objects (Kuhn, 1962; Friedman, 2008; De Boer, 2010). And in many ways this field resembles that of business when accounting for how technological advancements continuously recalibrate market interactions (i.e., motion) leading to new conceptualizations of business. The key difference is that the universe of business recalibrates to its objects, whereas in the natural sciences it is typically our perception that is recalibrated against a ‘static’ set of problems that all presumably have a solution.

The Galileo Affair is a crisp milestone articulating this point of perceptual recalibration (Gingerich, 1982). The ‘trial’² was motivated by the strict adherence to Aristotelian deduction as a central criterion of scientific truth emphasized by St. Thomas Aquinas (Turner, 1997; Wippel, 1989). In light of the Catholic Church’s reopening of the case in 1979, Gingerich (1982) clarified that “the Copernican system was not really the issue...The battleground was the method itself, the route to sure knowledge of the world” (137). While Galileo did observe the phases of Venus that “falsified the Ptolemaic system” (135), his logic followed that of induction by “drawing general conclusions from particular instances” (137), a method that “all scholastic philosophers of Galileo’s time knew cannot lead to indubitable truth” (137). In contrast, Kepler followed a deductive method and was not brought in front of the Inquisition even though he fine-

² Per Gingerich (1982) the matter was kept out of the court room; and spared the label of heresy.

tuned heliocentrism by noting the elliptical nature of planetary orbits. Cardinal Caetani's opinion that appears to preserve Galileo from the label of heresy is telling of the mentality: "If certain of Copernicus' passages on the motion of the earth are not hypothetical; then make them hypothetical; then they will not be against either the truth or the Holy Writ" (138). Again, the issue is methodological. "Today it is not the world "truth" but the world "model" that continually decorates the pages of scientific journals" (Gingerich, 1982: 137).

Another significant milestone pertains to the work of Immanuel Kant (1787) that is considered to have caused a 'Copernican Revolution' in epistemology (Hartman, 1949; Guyer, 1980), resulting in a recalibration of thought driven by the crisp findings of Newton's (1687) laws of motion a century before (Friedman, 2008). Kant's analysis is particularly important for our understanding of the *a priori*, through there is a lot of terrain to cover and I will only address the basic typology while avoiding the vast body of work that has dissected his analytical structure (e.g.s., Hodgson, 1877; Pap, 1944; Hartman, 1949; Beck, 1956; Goldstick, 1972; Guyer, 1980; Thompson, 1981; Palmquist, 1987; Friedman, 2008; De. Boer, 2010; Bremner, 2025). However, it is noteworthy to address how more recent conceptualizations have loosened the strict requirements on Kant's transcendental principles of universal and necessary by constraining the universe to the particular issue at hand; by allowing Newton's laws of motion to be a special case in Einstein's articulation of special and general relativity (Friedman, 2008; Kuhn, 1962; Reichenbach, 1920). That is, the shift from Newton to Einstein strengthens Kant's analytical structure, and in effect we observe the concept of *bounded transcendentalism* as parallel to the notion of bounded rationality applied to the human condition (Simon, 1955).

Typology of Epistemology

Figure 1 presents the typology of judgment in epistemology across two frames. Frame #1 addresses the ancient/traditional/Aristotelian *methodological* dichotomy between a priori analytic deduction and a posteriori synthetic induction (Palmquist, 1987); the former investigates directionally from the concept to the concrete event³, whereas the latter investigates the concrete event to its abstraction. Frame #2 addresses Kant's more nuanced analysis of the counter-

³ Gotshalk (1933) identifies three types of a priori: (1) a priori for knowledge, (2) a priori in knowledge, and (3) a priori knowledge. "The a priori for knowledge concerns characteristics in the object of knowledge" (255). "The a priori in knowledge, however, always concerns knowledge itself...and consists in those characteristics universally required of judgements to be pieces of knowledge." (254). "Discussions of the a priori have usually been devoted mostly to a priori knowledge, the third a priori. Kant held that mathematics and mathematical physics were instances of a priori knowledge of nature" (256).

diagonal (synthetic a priori and analytic a posteriori); the off-diagonal domains are of primary interest. And as addressed by Palmquist (1987), the method is distinct from the knowledge space in which the discovery exists; see also Hodgson (1877: 120) who notes “the terms analytic and synthetic serve properly to classify not judgments but methods”.

Kant introduced an integration of methods and the sources of judgment by way of a semantic analysis (Beck, 1956; Palmquist, 1987). As such, *analytic a priori* is defined as statements where the predicate is included in the subject (e.g., all bodies are extended; i.e., occupy space) (Hodgson, 1877; De Boer, 2010). These are propositions that are by definition true and obtained via deductive methods. Therefore, *analytical a posteriori* has been considered as illogical⁴, although Goldstick (1972) notes there are such possible semantic constructions based on the way one knows and not necessarily with the knowledge itself⁵. *Synthetic a priori* has been considered as the critical problem, addressing the notion that transcendental principles exist (Hodgson, 1877; Pap, 1944; Beck, 1956; Guyer, 1980); to Kant these were universal and necessary notions of space, time and causality (Kuhn, 1962; Wilson, 1975; Bremner, 2025); and we may also include the transcendental principles of logic itself — the minimum principle of contradiction or Aristotle’s more general form as the law of non-contradiction (Pap, 1944). Generally-speaking, this category of knowledge articulates those factors that address the structure of nature such as geometry, Newton’s laws of motion, alongside Einstein’s special and general relativity (Pap, 1944; Beck, 1956; Kuhn, 1962; Palmquist, 1987).

There are some challenges that emerge when trying to allocate mathematics as a whole into any single epistemological box; especially when considering that formal logic has been associated with *analytic a priori* following rules of deduction. When we view mathematics as just another language in the spirit of Kant’s semantic analysis, it is clearly present in formal logic and thus is observed in *analytic a priori*. And yet, and from a metaphysical investigation of how knowledge can exist outside of experience (the critical question as per Kant), it is safe to assume that mathematics is the language through which any truth in nature would be articulated; that which Kant refers to as *transcendental logic* (Pap, 1944; Beck, 1956); i.e., as synthetic a priori.

⁴ Goldstick (1972: 531): “If an ‘analytic’ truth is to be understood as a proposition whose truth can be established by means of unaided logical deduction, and an ‘a posteriori’ truth is to be understood as a truth which can be established only empirically, it will clearly then be logically impossible for any ‘analytic’ truths, as thus understood, to be ‘a posteriori.’”

⁵ “It is logically possible that all crows are black; it is logically possible that not all crows are black” (Goldstick, 1972: 532).

This would thus suggest that mathematics can be partitioned to different knowledge domains; where certain transcendental truths are discovered regardless of the method employed (deduction vs. induction). And yet, Einstein’s statement would appear to disagree with positioning mathematics as *synthetic a priori*: ““As far as the laws of mathematics refer to reality (nature) they are not certain, in so far as they are certain they do not refer to reality (nature).” And the mathematician, on the whole, appears to be content with such a state of affairs” (Gotshalk, 1933: 260)⁶.

Figure 1: [Standard] Typology in Epistemology

	Frame #1 Methods (Traditional View / Aristotelian)		Frame #2 Judgment (in Epistemology)	
	Analytic	Synthetic	Analytic	Synthetic
A Priori	Deduction From concept to concrete event		Predicate contained in the subject (True by definition) Formal Logic	<i>'The Critical Problem'</i> Transcendental Principles (Pure Intuition) <i>(Space, Time, Causality)</i> Construction of Nature (Natural Structure)
A Posteriori		Induction From concrete event to concept	<i>The Illogical Problem'</i> There exists analytic propositions that are true by definition but can only be known a posteriori (Goldstick, 1972)	Traditional Empirical investigations (Empirical Intuition)
			<i>All bodies are extended</i> <i>(occupy space)</i>	<i>All bodies are heavy</i> <i>(have mass)</i>

3 | ARTICULATION OF DISCOVERED INSIGHTS

The aforementioned mathematical structures were discovered after mentally extrapolating potential market interactions in two particular circumstances: one that pertains to a multi-buyer versus single-seller negotiation structure that uncovered combinatorics in how potential power is captured; another that pertains to the inherent structure of what Commons (1934) refers to as a strategic transaction captured in the exchange of capital for partial equity ownership in the firm

⁶ “...this knowledge is, in all cases, not a matter of pre-analytic fiat. Even where it concerns consciously formulated structures, it is the outcome of an analysis of instances or an instance of the construction in question. This means, in the third place, that like the knowledge in immanent metaphysics the knowledge here is, in a sense and to some extent, a posteriori, provided, to be sure, that by a posteriori is understood here merely the psychological fact of consultation with some instances. This knowledge, however, is a priori in the strict logical sense. That is, it is not particular and contingent, a mere summary of previous experience, valid only there.” (Gotshalk, 1933: 261-262)

(Oksoy, 2020). While these insights were obtained via an inductive methodology, I will argue that they fall into the category of synthetic a priori judgment; albeit boundedly-so.

Power

Power is inherent in the relative dependencies of the buyer and seller, and exists in both its actual and potential form. Both actors share the larger goal of extracting profits from the firm to increase personal wealth; the entrepreneur is dependent upon the investor to catalyze the venture, whereas the investor is one step removed from operations and is dependent on the entrepreneur to properly execute the strategy once an investment is made. This particular negotiation is therefore an ideal context to study power because of this structural shift that occurs before and after an investment, where power is the inverse of dependence (Emerson, 1962). Explicitly communicated negotiation positions capture this shift, because positions must be advanced in anticipation of this structural shift.

When accounting for multiple buyers (n) at the table under the following realistic generalizable conditions influence how each buyer can interact: competition with one another, collaboration in part or in whole, or abstention (Oksoy, et al., 2022). Under these conditions, we show that the seller (entrepreneur) enjoys an initial power advantage in terms of the total number of potential options that exists to close a deal when assuming that each option is equally likely to occur (i.e., possible). This potential option set for the seller is captured by the function $y = 2^{(n)} - 1$, in contrast to the total number of potential options for each buyer captured by the sister function of $y = 2^{(n-1)}$; for both option sets, (n) represents the number of actual buyers at the table.

The key takeaway is the counterintuitive finding that the seller enjoys a local power advantage in contrast to their global dependence on the capital investment. However, this advantage lasts only as long as buyer interest is retained. In this analysis, only one assumption is utilized to simplify the problem space: that the market is in perfect competition, where each buyer operates independently and is of equal strength with respect to their war chest; although we know this is not entirely true because of the heterogeneity of capital; although the seller's perception can be influenced during the negotiation to give them the impression that success is equally-likely with any investment from any buyer.

Another takeaway is how coalition formation and/or dissolution serves as an accelerant for power dynamics. Another takeaway is that the total hard options available to any buyer (i.e.,

their potential power) approximates to 50% of the seller's hard option set (i.e., potential power) as the number of active buyers in the market reaches 7. It is also interesting that the available options reduce by half in the event of a marginal contraction in the market of buyers. One final note of interest is that the product of these sister functions is the Euclid-Euler Theorem for perfect numbers $y = [2^{(n)} - 1] * [2^{(n-1)}]$, and that the seller's option set defined by the function $[2^{(n)} - 1]$ is also utilized in the Mersenne Prime Series. The implication is that the application of these sister functions outside of prime numbers pertains to market interactions; I find it interesting that both number theory and sociological power dynamics share the same mathematics.

Risk & Return

The risk-return relationship addresses the core [strategic] transaction in angel investing involving an exchange of capital for partial equity ownership in a nascent firm that alters the incentive and constraint structure (Commons, 1934); more specifically, this relationship addresses the cash-on-cash method of return calculation (e.g., 10x), circumstances where the traditionally utilized discounted cash flow model breaks down due to the heightened subjectivity (uncertainty) of projected firm operations driven by the anticipated high growth that motives an investment. The central assumption (reasonably made) is that negotiation positions unfold in a sequence, initially identifying the capital amount as pertaining to a firm-level need tethered to a strategic trajectory, to then consider the options available on equity. This paper addresses *that point* in time during the negotiation when capital (and therefore strategy) has been defined, to articulate the pattern of available options across the full range of equity is captured in the function $y = \frac{1}{x}$. The numerator represents the decision to invest or not (1 vs. 0), the denominator represents the equity options, and the quotient represents the free cash flows required for the investor to break even. The key takeaway is that the marginal benefit of greater equity positions diminishes at a rate of $y = -\frac{1}{x^2}$; and that all points on the curve reflects the distribution of the break-even point from the investor's perspective, providing an added risk-qualifier above and beyond the nominal dollars committed to the venture.

Ultimately, this function provides a degree of transparency to both parties at the table and introduces a means of leveling the playing field via situational awareness; we are thereby able to reduce a degree of subjectivity via pure economic logic. This transparency should in-turn lead to

better calibration between buyer and seller, to in-turn improve return metrics and encourage greater participation in this sliver of the economy.

Epistemology in the Markets

In the spirit of bounded transcendentalism (Reichenbach, 1920; Friedman, 2008; De Boer, 2010; Bremner, 2025), Figure 2 extends the typology of judgment from epistemology to the capital markets. I will argue that the aforementioned insights fall into the synthetic a priori category — that these structures exist regardless of experience. To anchor the argument, I will note that there already exists a universal and necessary transcendentalism premise accepted by all business scholars: *that firm profits are a function of uncertainty* (Knight, 1921; Rapp & Olbrich, 2023; Dorobat et al., 2025).

For analytic a priori, I make Kantian expressions based on Commons' (1934) statement that a transaction is the unit of measure in an economy: *all firms have transactions* (akin to Kant's statement that all bodies are extended; i.e., occupy space). Additionally, and influenced by the notion of exchange complexity as reflecting a firm's economic footprint (Oksoy et al., 2024), we can state all transactions have an exchange complexity, or likewise, all firms have an exchange complexity footprint. For synthetic a posteriori I make the statement that *all firms have scale*, akin to Kant's phrase that all bodies are heavy (i.e., have mass). Punting on the example of analytic a posteriori, I introduce three statements (A, B, and C) that fall into the synthetic a priori domain. Each of these statements are universal and necessary for their respectively-defined worlds; statement A for how power shifts in a multi-buyer versus single-seller negotiation context; statement B and C for the risk-return relationship:

Statement A: The options available to a buyer in a multi-buyer vs. single-seller negotiation context approximates to 50% of the options available to the seller under the following generalizable conditions: (i) competition among buyers, (ii) and/or cooperation among buyers, (iii) all parties can abstain, and (iv) the seller has final veto rights;

Statement A.1: the buyer's available options pattern adheres to the function [$y = 2^n - 1$]

Statement A.2: the seller's available options pattern adheres to the function [$y = 2^{(n-1)}$]

Statement B: The total option set on equity exhibits a crisp pattern in relation to the break-even point, where the distribution of break-even points maps to the function [$y = \frac{1}{x}$], where x represents equity greater than zero and less than 100%.

Statement C: The benefit of the marginal equity percentage point for the investor diminishes at a rate of [$y = -\frac{1}{x^2}$] in relation to the investor's break-even point.

Figure 2: Judgment Typology (in Business)

	Judgment (in Business)			
	<i>Frame #3</i> Epistemological Delineation		<i>Frame #4</i> Semantic Examples	
	Analytic	Synthetic	Analytic	Synthetic
A Priori	Constructs * Risk as a capital investment (March & Shapira, 1987) * Power as the inverse of dependence (Emerson, 1962)	Derived generalizations describing the natural structure of a particular market interaction $(2^{\sqrt{60}} - 1) * (2^{\sqrt{60} - 1})$ $y = 1/x$	All firm have transactions (Commons, 1934) All transactions have an exchange complexity All firms have an exchange complexity footprint	Profit is a function of uncertainty (Knight, 1921) 'Statements (A, B, C)
A Posteriori	(Punt); not germane to this study	Empirical investigation into power and the risk-return relationship	(Punt); not germane to this study	All firms have scale

4 | UNCERTAINTY TYPOLOGIES

The indeterminant nature of market outcomes has motivated efforts to delineate uncertainty into different classifications in a mirrored effort of the epistemological delineation of judgment more-generally (i.e., knowledge; ‘certainty’). In this section I review and critique two recently introduced typologies noting that they have not accounted for the temporal dimension (time pressures to act) nor the actor’s proactive ability to effectuate change in the market (to influence it).

To set the context, Cantillon’s (1755) emphasis on business judgement serves as an initial barometer of thought, as paraphrased by Herbert and Link (2006: 338): “buying at a certain price and selling at an uncertain price”. Knight’s (1921) delineation is the first significant milestone, treating uncertainty as a monolith to establish that it exists distinct from mitigable (insurable) risk. Milliken (1987) clarifies that it “is not change per se, or even a fast rate of change, that creates uncertainty about the environment; rather, it is unpredictable change” (pg. 135); “uncertainty will be defined as an individual’s perceived inability to predict something accurately” (136). And as addressed earlier, uncertainty serves as both the fundamental challenge and as the universal and necessary condition through which profits can be generated due to information deficiencies across the market (Dorobat et al., 2025; Rapp & Olbrich, 2023; Hayek, 1945). Dorobat et al.’s, (2025) conclusion from their extensive review of the influence that Knightian uncertainty has had on the scholarly literature at micro, meso, and macro-levels summarizes things nicely:

“...our reading of the primary and secondary sources in this review suggests that Knightian uncertainty is unique in that it refers, not to knowledge or information currently unknown but potentially knowable, but to situations when estimates of future contingencies can only be understood as subjective conjectures.” (212)

Milliken’s (1987) delineation of [perceived] environmental uncertainty is one foundational typology depicting state, effect, and response uncertainty. More recently, Packard, Clark and Klein (2017) chronical all typologies starting from Knight (1921) through Dequech (2011)⁷ in an effort to advance their own “novel classification scheme for different types of perceived uncertainty” (841). I review (critique) these two typologies in relation to Knight’s original conceptualization of uncertainty as a monolith, advancing novel arguments to further the dialogue as per the call by Rapp and Olbrich (2020). As mentioned, I address the lack of a temporal consideration and the apparent reactive stance of the actor.

I find the typology introduced by Packard et al. (2017) to be too constrained by the 2x2 matrix structure from which definitions are developed; the authors dichotomize the *options* available to act versus the potential *outcomes* into an open vs. closed classification for each. In particular, their definition of environmental uncertainty as an open outcome set versus a closed option set implies that one must act under time pressures in reaction to the environment and does not account for the ability to be patient and let the event ‘pass by’, after which different options may become available. When we consider the nature of how the message can be delivered, and the potential for the actor to delay action to wait for the right time (i.e., strategic patience), options are not necessarily closed considering that the environment is continuously in flux⁸. Further, and in relation to Knightian uncertainty, the difference between environmental uncertainty and absolute uncertainty (open options and open outcomes) is a bit confounding from the perspective of the practitioner’s lived-reality; there is no escape from the environment that we live in, and it is *that environment* (i.e., the market) that is the source of [Knightian] uncertainty; the notion of absolute uncertainty would suggest that an indiscernible hierarchy

⁷ Due to space limitations, I avoid making comments on Dequech’s (2011: 624) dichotomization of weak vs. strong uncertainty in relation to substantive vs. procedural uncertainty; Dequech ultimately appears to equate Knightian uncertainty to the interplay of fundamental uncertainty as the “possibility of non-predetermined structural change” and procedural uncertainty as computational limitations [of the mind].

⁸ It is also worth noting Georg Cantor distinction between “the potential and actual infinite” (Dauben, 1977: 87), pointing out that not all infinities are the same

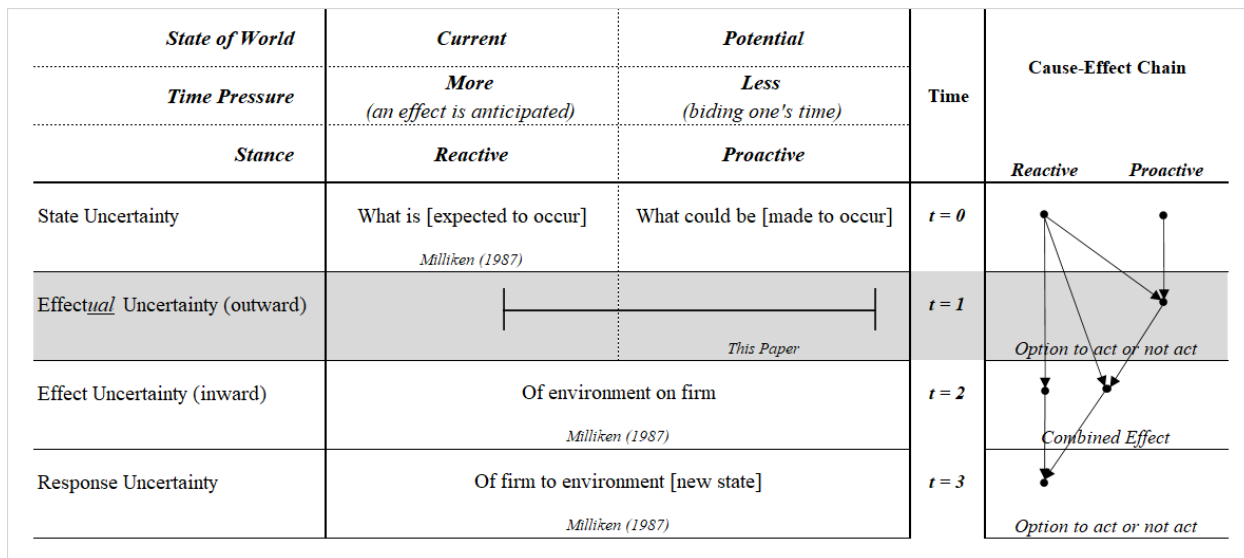
exists within the monolith of uncertainty. Further, do we really have open options due to the reality of one's dependence on resources (Emerson, 1962; Pfeffer & Salancik, 1978; Barney, 1991)? Ultimately, the business practitioner lives in the fluctuating space between an open versus closed dichotomy.

The definition of creative uncertainty (as closed outcomes and open options) is likewise problematic. To take the example of a sculptor as per the authors, are we considering the story from the initial chip of the sculptor's chisel or once the point of no return has been reached for any particular medium utilized by the artist to convey the image? I may argue that in business we are continuously recalibrating our sense of success (i.e., satisficing; Simon, 1955), and a closed outcome set implies we are tethered to the intended strategy and are *closed to* emergent ones (Mintzberg, 1978; March 1991). What about the creativity associated with the writer whose semantic medium is even more pliable to work with than marble? Cannot the creator's vision for what *should be* also change?

I find Milliken's (1987) typological structure as less-constraining, and adhering more-directly to Knight's original conceptualization based on her analysis of cause-and-effect in relation to the singular notion of [perceived environmental] uncertainty. However, definitions across the typology are constrained by a focus on the administrative function of a going concern: "It is hypothesized that three types of "environmental uncertainty" can be experienced by an organization's administrators as they try to understand, make sense out of, and *respond to* conditions in the external environment" (133; emphasis added). *State uncertainty* is "when they perceive the organizational environment, or a particular component of that environment, to be unpredictable" (136); *effect uncertainty* is articulated via the example of an impending hurricane with unknown effect, and "defined as an inability to predict what the nature of the impact of a future state of the environment or environmental change will be on the organization" (137); *response uncertainty* is "is defined as a lack of knowledge of response options and/or an inability to predict the likely consequences of a response choice" (137). These definitions paint the story of a firm *trying to maintain* existing business activity in the face of [potential] exogenous shocks to the status quo, implying that one is not able to not act in the face of significant time pressures. What about the entrepreneur creating that 'shock' to the system? Is there no environmental uncertainty there?

What appears to be missing is the proactive behavior of the entrepreneur that influences the market to react. And the uncertainty associated with this type of action I refer to as *effectual* uncertainty, where effectuation “processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means” (Sarasvathy, 2001: p. 245)⁹. I effectively suggest that there exists a secondary cause that will impact Milliken’s effect uncertainty (environment’s impact on the firm) as opposed to just a direct link from the state to the effect; effect uncertainty thus becomes a composite of what the state is and what the state could be influenced to be. Response uncertainty at $t=3$ remains unchanged, though the proactive stance does suggest that the practitioner need not ‘respond’ if the directionality of one’s effectuation went in one’s favor (again, implying lower time pressures). As such, a response is not a foregone conclusion as it is in Milliken’s typology. Figure 3 provides a visual:

Figure 3: Modified Cause-Effect Chain of Uncertainty



5 | THE PRACTICAL INAPPLICABILITY OF THE A PRIORI IN BUSINESS

In this final section I address the difficulty of applying these insights to the marginal event. That is, the market-level patterns are not predictive but entirely descriptive due to the indeterminant nature of market outcomes, recognizing that market outcomes are socially-constructed via explicit exchanges (or transactions) and do not become real for the firm until it is

⁹ Note that I dismiss the notion of causation due to the inability to “take a particular effect as given” (Sarasvathy, 2001: 245) when engaged in strategic actions; one can further argue all actions are effectual and that causation is an a posteriori determination.

captured on the P&L. But even if explicit (objective) transactions do exist, it is still difficult to assign a direct causality.

The dismal return metrics for angel investing articulates this point; ~70% result in a total loss, ~20% hover around break-even, and only ~10% attain initial 10x return expectations. The issue is that all decisions were made with a 10x expectation else why would an independently-wealthy individual engage in an entirely discretionary investment when they can afford to be discerning and highly patient. As such, the underlying bet is highly subjective and driven by the nascent stage of the firm that allows one to untether existing operational capabilities (i.e., what is) from what could be, leading to inflated speculation as to what the future holds. Being ‘correct’ then, is entirely relative to one’s initial risk and is captured via one’s return on investment; although we must also recognize that one could have made a bet for wrong reasons to then just get lucky. And from the *a priori* vantage point, at the time offers are communicated, it is entirely unknowable if a low capital / high equity offer from Buyer A will lead to a better or worse outcome than the opposite offer from Buyer B; naturally, this is partially due to the chemistry of the post-investment working relationship.

All that these [synthetic] *a priori* insights convey is that a pattern exists, to thereby introduce a degree of transparency to market interactions. This is not meant to diminish the importance of transparency, but rather to set the upper limit of the benefit of *a priori* information in the markets as that of transparency and not of prediction. Yet, I contend that transparency is in-of-itself a profound contribution to the market that is so dominated by power and that thrives in circumstances of heightened subjectivity to effectively create a [cognitive] fog.

Consider for example the angel investor who requests 75% equity from an entrepreneur in a small town before the internet, to then consider the post-internet environment. While the internet has contributed to greater transparency at the market-level, the individual events are still opaque — market participants merely enjoy access to a larger market of buyers or sellers. The buyer still retains their inherent power advantage, especially if their investments are entirely discretionary and they do not need to engage in any particular deal (Bazerman, Maglioni & Neale, 1985; Emerson, 1962). That is, subjectivity still reigns supreme at the marginal event, and this is not the kind of transparency that the aforementioned insights provide. Rather, the patterns associated with power and risk-return convey a sense of one’s relative position in the global (risk-return) or local (power) context.

I refer to the risk-return relationship as a global pattern because it applies to all exchanges of capital for partial equity ownership, applicable when using the cash-on-cash method for return calculations. In terms of what transparency is provided, the ability to identify the pattern of the full option set yields an understanding of the diminishing benefit of the marginal equity percentage point internalized by the buyer, at a rate of $\frac{-1}{x^2}$, when it comes to attaining the break-even point. Practically this translates to the ability to push-back via the use of an unquestionable mathematical structure, pointing out to the buyer that a 75% equity request is not mathematically logical given the extreme difficulty of even approaching the break-even point; 51% equity achieves the ‘same’ outcome from a purely risk-return perspective. Such an understanding also opens other possible negotiation positions such as a stepped-down equity structure (that I advocate for), recognizing that the buyer is ‘at risk’ only until the break-even point. Thus, a higher initial equity position should help ‘speed’ the investor through the ‘at-risk’ period, leading to a stepping down to further incentivize the entrepreneur.

I refer to the transparency provided by the power functions as a local pattern because it applies to all negotiations structures as (n) buyers versus a single seller, where buyers have the option to collaborate, compete, or abstain. In terms of a priori information, all the actor can know is *how* the nature of power *can* shift once they have entered the negotiation room. Once in the room, the pattern should help the actor make better judgments; and yet, that shift is now also observable (and mathematically quantifiable) by the buyers in the room who may wish to exercise patience until power shifts further in their direction. This is yet another example of how the nature of uncertainty evolves in a market.

REFERENCES

- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17, 99–120.
- Bazerman, M. H., Maglioni, T., & Neale, M. A. (1985). Integrative bargaining in a competitive market. *Organizational behavior and human Decision Processes*, 35(3), 294-313.
- Bealer, G. (1999). A Theory of the A Priori. *Philosophical perspectives*, 13, 29-55.
- Beck, L. W. (1956). Kant's theory of definition. *The Philosophical Review*, 65(2), 179-191.
- Boudreaux, D. J., & Holcombe, R. G. (1989). The Coasian and Knightian theories of the firm. *Managerial and Decision Economics*, 147-154.
- Vaccarino Bremner, S. (2025). The Relativized A Priori, the Historical A Priori, and the Symbolic Form. *Philosophy Compass*, 20(6), e70044.
- Commons, J. R. (1934). *Institutional Economics. Vol. I: Its Place in Political Economy (Vol. 1)*. Transaction Publishers.
- Dauben, J. W. (1977). Georg Cantor and Pope Leo XIII: Mathematics, theology, and the infinite. *Journal of the History of Ideas*, 38(1), 85-108.
- De Boer, K. (2010). Pure reason's enlightenment: Transcendental reflection in Kant's first critique. *Kant Yearbook*, 2(1), 53-73.
- Dequech, D. (2011). Uncertainty: a typology and refinements of existing concepts. *Journal of economic issues*, 45(3), 621-640.
- Dorobat, C. E., McCaffrey, M., Foss, N. J., & Klein, P. G. (2026). Knightian uncertainty in entrepreneurship research: Retrospect and prospect. *Entrepreneurship Theory and Practice*, 50(1), 192-230.
- Emerson, R. M. (2019). Power-dependence relations. In *Power in modern societies* (pp. 48-58). Routledge.
- Foss, N. J., & Klein, P. G. (2012). *Organizing entrepreneurial judgment: A new approach to the firm*. Cambridge University Press.
- Friedman, M. (2008). Einstein, Kant, and the a priori. *Royal Institute of Philosophy Supplements*, 63, 95-112.
- Gingerich, O. (1982). The Galileo Affair. *Scientific American*, 247(2), 132-143.
- Goldstick, D. (1972). Analytic A Posteriori Truth?. *Philosophy and Phenomenological Research*, 32(4), 531-534.
- Gotshalk, D. W. (1933). The A Priori. *The Journal of Philosophy*, 30(10), 253-262.
- Guyer, P. (1980). Kant on Apperception and "A Priori" Synthesis. *American Philosophical Quarterly*, 17(3), 205-212.
- Hartman, R. S. (1949). The Epistemology of the A Priori. *Philosophy and Phenomenological Research*, 9(4), 731-736.
- Hayek, FA (1945). The Use of Knowledge in Society. *The American Economic Review*, 35, 519-530.
- Hébert, R. F., & Link, A. N. (2007). Historical perspectives on the entrepreneur. *Foundations and trends in entrepreneurship*, 2(4), 260-408.
- Hodgson, S. H. (1877). Kant's Analytic and Synthetic Judgments, and his question, How synthetic à priori judgments are possible. *Mind*, 118-122.
- Kant, I. (1998). *Critique of pure reason* (P. Guyer & A. W. Wood, Trans.). Cambridge University Press. (Original work published 1787)
- Kirzner, I. M. (1973). *Competition and entrepreneurship*. University of Chicago press.

- Knight, F. H. (1921). Risk, uncertainty and profit (Vol. 31). Houghton Mifflin.
- Kuhn, T. S.: 1962, *The Structure of Scientific Revolutions*. Chicago: The University of Chicago Press, (1970a) 2nd ed. enlarged.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization science*, 2(1), 71-87.
- Milliken, F. J. (1987). Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management review*, 12(1), 133-143.
- Mintzberg, H. (1978). Patterns in strategy formation. *Management science*, 24(9), 934-948.
- Oksoy, A. S. (2020). Two essays on negotiations between entrepreneurs and angel investors. Old Dominion University.
- Oksoy, A. S., Farrell, M. R., & Li, S. (2025). A Different Risk–Return Relationship. *Risks*, 13(2), 22.
- Oksoy, A. S., Nair, A., & Willis, C. H. (2022). Potential power in a Quasi-competitive market. *Negotiation Journal*, 38(1), 35-68.
- Packard, M. D., & Clark, B. B. (2020). Mitigating versus managing epistemic and aleatory uncertainty. *Academy of Management Review*, 45(4), 872-876.
- Packard, M. D., Clark, B. B., & Klein, P. G. (2017). Uncertainty types and transitions in the entrepreneurial process. *Organization Science*, 28(5), 840-856.
- Palmquist, S., & Palmquist, S. R. (1987). Kant's system of perspectives and its theological implications (Doctoral dissertation, University of Oxford).
- Pfeffer, J., & Salancik, G. (2015). External control of organizations—Resource dependence perspective. In *Organizational behavior 2* (pp. 355-370). Routledge.
- Rapp, D. J., & Olbrich, M. (2020). On entrepreneurial decision logics under conditions of uncertainty: an attempt to advance the current debate. *Journal of Innovation and Entrepreneurship*, 9(1), 21.
- Rapp, D. J., & Olbrich, M. (2020). *On predictive entrepreneurial action in uncertain, ill-structured conditions. Review of Managerial Science*, 15(7), 1961-1979.
- Rapp, D. J., & Olbrich, M. (2023). From Knightian uncertainty to real-structuredness: Further opening the judgment black box. *Strategic Entrepreneurship Journal*, 17(1), 186-209.
- Rapp, D. J., Olbrich, M., & Packard, M. D. (2026). *A logic of entrepreneurial action without judgment? Effectuation revisited. Review of Managerial Science*, 1-24.
- Reichenbach, H. (1920). *Relativitätstheorie und Erkenntnis apriori*. Springer.
- Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of management Review*, 26(2), 243-263.
- Seth, A. (1892). Psychology, epistemology and metaphysics. *The Philosophical Review*, 1(2), 129-145.
- Simon, H. A. (1955). A behavioral model of rational choice. *The quarterly journal of economics*, 99-118.
- Simon, H. (1957). A behavioral model of rational choice. *Models of man, social and rational: Mathematical essays on rational human behavior in a social setting*, 6(1), 241-260.
- Thompson, M. (1981). On a priori truth. *The Journal of Philosophy*, 78(8), 458-482.
- Turner, G. (1997). St Thomas Aquinas on the “scientific” nature of theology. *New Blackfriars*, 78(921), 464-476.
- Wilson, K. D. (1975). Kant on intuition. *The Philosophical Quarterly* (1950-), 25(100), 247-265.
- Wippel, J. F. (1989). Truth in Thomas Aquinas. *The Review of Metaphysics*, 295-326.